Molluscan Remains from the Philo II Site, Muskingum County, Ohio

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ABSTRACT

Examination of the molluscan fauna retrieved from the first 41 features at the Philo Site, Muskingum County, Ohio (Gartley, Carskadden, and Morton 1976) reveals a bivalve fauna consisting of 20 taxa and 4 terrestrial gastropod species. *Obovaria olivaria* Rafinesque has not previously been recorded from the Muskingum River. Overall composition of the naiad fauna indicates that the bulk of shellfish harvesting occurred in comparatively shallow water, probably on sand or fine gravel bars. Subsequent analysis of molluscs from 8 additional features confirms the overall species composition of the sample, adding 5 more naiad species and 2 aquatic gastropod species to the faunal list.

Introduction

ALTHOUGH Hildreth (1828) described several naiad species from the Muskingum River, there are few subsequent published records. Ortmann (1919) gave numerous records from the Tuscarawas River, a major tributary of the Muskingum, as had Sterki (1907) earlier, but there are few records available for the Muskingum River proper. Allowing for biases due to 1) collecting preferences by the aborigines and 2) sampling inconsistencies during excavation, the Philo II molluscan sample should present a relatively accurate picture of the original naiad population of the mid-portion of the Muskingum River. Bias due to the first of the 2 aforementioned causes is considered to be of some significance, whereas the second cause is believed to be of minimal importance in the present instance, at least in so far as the naiad material is concerned.

Sample Size and Composition

A total of 912 individual naiad shells distributed among 20 features (refuse pits) represent 20 species or subspecific forms. The distribution of these taxa is presented in Table 1. The minimum number of individuals represented in each pit varies from 1 to 120, with the mean being 27. Total minimum number of individuals represented in the collections is 549, if features are treated discretely, and 501 if the collection is considered *en masse*.

Broken down by subfamily, the Philo II collection consists of 46.96% Unioninae, 0.76% Anodontinae, and 52.68% Lampsilinae. This compares well with data available from several sites near Chillicothe, along the Scioto River. (Stansbery, 1965; Murphy 1970. n. d.). The particularly low percentage of the Andontinae is consistent with the interpereetation that the mollusc collections were made from shallow bars or riffles; the anodontid naiads generally characterize rather deep, quiet pools.

The 3 most abundant species at Philo II are *Pleurobema coccineum* (Conrad), *Actinonaias ligamentina* (Lamarck), and *Lampsilis ovata* (Say), comprising 60.0% of the total minimum number of individuals. The 2 next most abundant species, *Dysnomia torulosa rangiana* (Lea) and *Ptychobranchus fasciolare* Rafinesque, account for an additional 18.3%

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Table 1
Number of Left and Right Valves of Naiads by Feature

Species	Feature	1	2	3	4	5	9	16	20	23	27	28	31	32	34	35	36	37	39	40	41	Minimum Number
Amblema plicata (Say 1817)			5-2	1-1		0-2	1-0		1-0	3-1	1-1			1-0						1-1	8-7	24
Quadrula cylindrica (Say 1817)										1-0											1-2	3
Cyclonaias tuberculata (Rafinesque 1820)			0-1							1-1	1-0	0-1		1-1					1-0	0-1	1-1	8
Plethobasus cyphyus (Rafinesque 1820)		2-2	3-1							0-1						1-0	0-1		0-1			9
Pleurobema clava (Lamarck 1819)			1-1							2-0						0-1	1-0			1-0	8-8	14
P. cordatum (Rafinesque 1820)			17-10		0-2			0-1	1-2	1-0	2-1			0-2		0-1	4-3		0-1		8-6	23
P. coccineum (Conrad 1836)		17-14	17-9	7-12	0-1	1-0	1-1	1-0	5-2	16-20	7-2	2-1	1-0	5-3			3-6	0-2	3-9	24-20	25-26	157
Elliptio dilatatus (Rafinesque 1820)					1-0		1-1	1-0		0-2				0-1			1-3					9
Lasmigona complanata (Barnes 1823)				0-1																		1
Alasmidonta marginata Say 1818																	1-0				1-0	2
Strophitus undulatus (Say 1817)																					1-0	1
Lampsilis ovata (Say 1817)		2-3	17-11	0-2	2-2					2-4							8-13		1-0	1-0	16-11	59
Lampsilis ovata ventricosa (Barnes 1823)								1-0														1
Ptychobranchus fasciolaris Rafinesque 1819				0-2					0-1	3-6	1-0						5-3	1-1	0-1	1-1	8-16	34
Cyprogenia irrorata (Lea 1828)			2-1							1-1	1-0	0-1					1-1		0-1	1-0	3-2	11
Obovaria olivaria (Rafinesque 1820)																	1-1					1
Actinonaias ligamentina (Lamarck 1819)		26-33	2-5	1-0					0-1	12-5	1-3				2-0	0-1	12-9		2-5	7-6	24-24	105
Proptera alata (Say 1817)			1-0														2-0					3
Ligumia recta (Lamarck 1819)			2-2	17-11				1-2									1-0				4-1	26
Dysnomia torulosa rangiana (Lea 1839)				16-21	1-1	0-1			1-1	1-1	1-1	2-0					19-26			0-1	2-3	58
		47-52	67-43	42-50	4-6	1-3	3-2	4-3	8-7	43-42	15-8	4-3	1-0	7-7	2-0	1-3	59-66	1-3	7-18	36-30	110-107	

of the fauna. Of these 5 species, *D. torulosa* and *P. fasciolare* are among the 3 most abundant species at the Scioto River sites (Blain, Kramer, and McGraw), while *P. coccineum* and *L. ovata* are among the 5 most abundant species at Kramer (where they formed a significant percentage of the total). *Lampsilis ovata* and *Actinonaias ligamentina* are among the 6 most abundant species at the McGraw site where they also form a significant percentage of the total fauna. At the Blain site *P. coccineum* and *L. ovata* are among the 5 most common species though they are not at all abundant in the Blain collection. These data suggest a remarkable uniformity in the species selected by the aborigines at these various sites; this may be due to a preponderance of these species among the original naiad populations at these sites or to a decided preference for these species by the aboriginal occupants of the sites. Most likely, the samples reflect both of these factors to some extent, but the abunddance of these species in the collection is probably a reflection of the ecology of the aboriginal collecting station rather than a result of conscious selection of specific taxa by the aboriginal inhabitants of the Philo II site.

Ecological Inferences

By analyzing the present-day ecological predilections of the 20 species represented at the Philo II site, it should be possible to infer something of the nature of the riverine habitat utilized by the people who lived at the site. Based primarily upon the observations of Baker (1928), it is clear that the vast majority of the naiad species represented in the Philo II collections thrive in a strong, swift current, in moderate sized rivers with water less than 2m deep, and on riffles or bars composed of sand or gravel. Such a habitat was probably of common occurrence along the Muskingum River prior to 1841 when the river was canalized for slackwater navigation.

Several species, represented by a very small number of individuals, do not accord with such an interpretation. *Lasmigona complanata* prefers quiet waters and a mud substrate. *Strophitus undulatus* also is characteristic of quiet water, typically in small streams or creeks, though Baker (1928) reports it also occurring on riffles, sand and gravel, in strong currents. *Alasmidonta marginata* is also more characteristic of the smaller streams and creeks. All told, however, these species represent only 4 individuals, an exceedingly small percentage of the total, and may be disregarded as aberrant individuals.

Species Previously Unrecorded for the Muskingum River

Hildreth (1828) recorded 13 naiad species from the Muskingum River near Marietta. This is undoubtedly a small proportion of the total original naiad fauna of the Muskingum. There is no reason to doubt that the complete fauna ranged somewhere in the neighborhood of 50 species, similar to the much better studied fauna of the Scioto (Stansbery 1965). Sterki (1907) lists considerable naiad fauna from Ohio, but cites only 15 taxa as having been found specifically in the Tuscarawas River. He cites none from the Muskingum River proper.

Sterki notes, in particular, that *Obovaria olivaria* is not found in "tributaries of the Ohio" and that *Proptera alata* is not found in the Tuscarawas. Both species, however, are represented in the Philo II sample, albeit by only 4 individuals. All other naiad species represented in the Philo collection have previously been reported from either the Muskingum River proper or from the Tuscarawas River.

Gastropod Sample

The Philo II molluscan assemblage is remarkable for the dearth of gastropod shells. No aquatic snails are represented in the original sample, and there are only 4 terrestrial species, as shown in Table 2. The absence of aquatic gastropods is not particularly surprising; they are usually carried to the site incidental to shellfish collecting. The absence of land snails from the refuse pit contents is noteworthy. Carskadden (1975 pers. comm.)

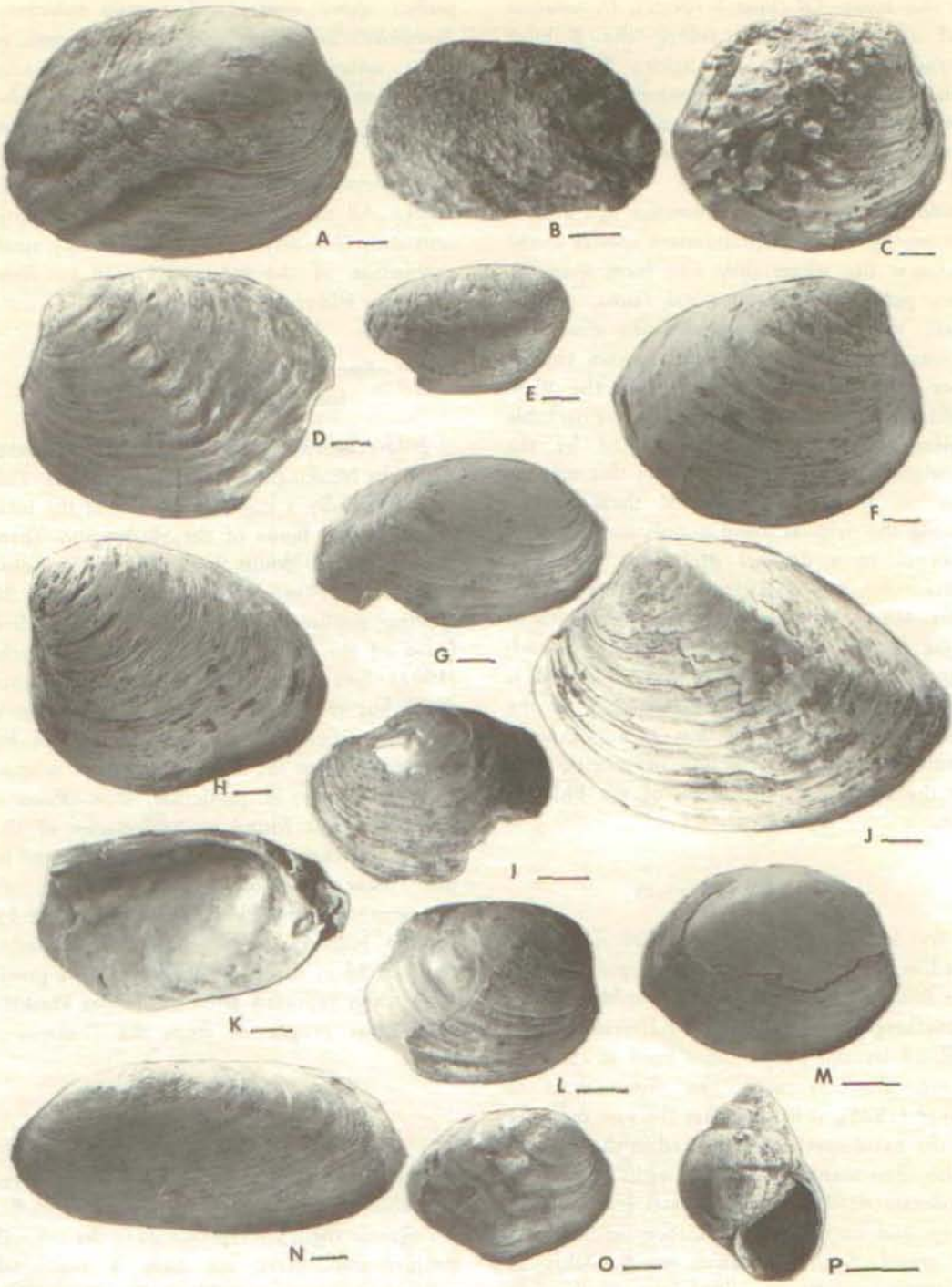

Fig. 1. A. *Amblema plicata* (Say), B. *Trifogonia verrucosa* (Rafinesque), C. *Cyclonaias tuberculata* (Rafinesque), D. *Plethobasus cyphyus* (Rafinesque), E. *Pleurobema clava* (Lamarck), F. *Pleurobema coccineum* (Conrad), G. *Ptychobranchus fasciolare* Rafinesque, H. *Pleurobema cordatum* (Rafinesque), I. *Lampsilis fasciola* Rafinesque, J. *Lampsilis ovata* (Say), K. *Lampsilis anadontoides anadontoides* (Lea), L. *Obovaria olivaria* Rafinesque, M. *Actinonaias ligamentina* (Lamarck), N. *Ligumia recta* (Lamarck), O. *Dysnomia torulosa rangiana* (Lea) P. *Campeloma decisum* (Say).

Linear scale indicates 1 cm.

Table 2
Gastropods from the Philo II Site

Species	Feature	4	34	41	53	55
Anguispira alternata (Say 1817)		1				
A. kochi (Pfeiffer 1845)						1
Haplotrema concavum (Say 1821)						1
Mesodon inflectus (Say 1821)			2			
Mesodon tyhroides (Say 1816)				1		
Retinella electrina (Gould 1841)				1		
Campeloma decisum (Say 1817)					1	
C. integrum obesum (Binney 1865)					1	

does not believe that the gastropods were overlooked or ignored during the course of excavation and stresses that particular attention was given to watching for gastropod remains, especially as their rarity at the site became apparent. Contents of the refuse pits were not screened; however, and this must be considered a likely reason for the dearth of gastropod specimens in the collection.

Conclusions

Molluscan remains are common at the Philo II site, occurring in 20 of the first 41 excavated refuse pits and must have formed a significant portion of the aboriginal diet, at least during the summer months. The occurrence of *Obovaria olivaria*, though represented by only a single individual, is particularly significant, for this species is generally confined to the deeper channels and would, therefore, most probably be collected during periods of low water.

In short, it is difficult to improve upon Hildreth's own observations:

> They [Unios] must also have been deemed very valuable as an article of food; as we find vast beds of the calcined shells, in the banks of the river, usually several feet below the present surface, and near them a hearth of stone with ashes and fragments of deer and fish bones promiscuously interspersed. In those seasons of the year, when the waters were low, and game scarce, they no doubt constituted a large portion of their food. Some of the species are very fine eating, and much admired by the lovers of shell fish at the present day, particularly the Unio ellipticus [*Actinonaias ligamentina*] and Alsmodonta complanata [*Lasmigona complanata*], which are very large, and in the month of September abound in fat, to the extent of one or two ounces of clear oil in a single individual.

Hildreth also notes that the naiads were becoming less numerous in the Muskingum River, noting 3 natural enemies:

> They were in such abundance that a single individual could collect twenty five or thirty bushels in a day– But at present, I think they are less numerous, being destroyed in the low stages of water by hogs, which become very fond of them and will spend whole days in the water searching for their favorite food; many times preferring them to corn, which they have been known to leave, and go in search of the more luscious clam. They have also other harrasing enemies in the Muskrats; which collect vast heaps of shells at the mouths of their favorite retreats, in the vicinity of some sunken log, on which they sit and feast upon the choicest of the molluscous race. It is also said that the white perch [*Aplodinotus grunniens*] make use of the more thin shelled varieties, for food; being provided with strong bony plates, thickly studded with smooth round teeth, and placed in the back part of the fauces, well calculated to perform the office of 'nut crackers.'

Hildreth did not foresee a fourth and more formidable enemy, modern pollution, which is rapidly causing the extinction of all but the hardiest of naiad species. Indian shell middens remain our major source of information on the original naiad fauna of the Muskingum River.

Addendum

Subsequent to completion of work on the naiad fauna available from the first 41 features excavated at Philo II, an additional sample was supplied from features 43 through 53. Eight of these features contained naiad remains, a break-down by species being presented in Table 3. Of particular interest is the large (minimum number of individuals=432) sample from feature 53, which contained 4 naiad and 2 aquatic gastropod species not represented in any of the other Philo II features. Feature 48 also contained a single valve of a species not otherwise known from the site, raising the total naiad fauna from Philo II to 25 species. This second sample is

Table 3
Number of Left and Right Valves of Naiads by Feature

Species	Feature 43	44	46	47	48	51	52	53	Min. No. Indiv.
Amblema plicata (Say 1817)		1-0	1-1	0-2	5-2	1-1	0-1	11-18	29
Quadrula pustulosa (Lea 1831)					0-1				1
Tritogonia verrucosa (Rafinesque 1820)								2-2	2
Cyclonaias tuberculata (Rafinesque 1820)			1-0		1-3	1-0		6-5	11
Plethobasus cyphysus (Rafinesque 1820)					1-1	0-1		2-2	4
Pleurobema clava (Lamarck 1819)					0-1	0-1	0-1	28-26	31
P. cordatum (Rafinesque 1820)	0-2		2-1		10-5	1-2		27-30	46
P. coocineum (Conrad 1836)	2-2	1-3	5-11	3-1	25-28	2-2	0-2	80-63	129
Elliptio dilatatus (Rafinesque 1820)			2-1		3-4	1-0		26-16	33
Lasmigona castata (Rafinesque 1820)								1-2	2
Strophitus undulatus (Say 1817)			0-1					2-2	3
Lampsilis anadontoides anadontoides (Lea 1831)								0-1	1
L. ovata (Say 1817)	2-0		4-2		6-7	0-1		26-24	40
L. ovata ventricosa (Barnes 1823)								2-2	2
L. fasciola Rafinesque 1820								2-0	2
Ptychobranchus fasciolaris (Rafinesque 1820)			0-2		0-1	3-1		53-46	59
Cyprogenia irrorata (Lea 1828)			0-1					8-7	9
Actinonaias ligamentina (Lamarck 1819)		0-1	3-6		2-2	3-5		102-87	116
Proptera alata (Say 1817)								0-1	1
Ligumia recta (Lamarck 1819)			1-2					7-5	9
Dysonomia torulosa rangiana (Lea 1839)		0-1			3-3	0-1		25-28	33
	4-4	2-5	19-28	3-3	56-58	12-15	0-4	410-367	

actually slightly larger than the total contents of the first 20 molluscan-bearing features.

The overall composition of the fauna represented in these 8 additional features is essentially identical with the previously analyzed sample. *Pleurobema coccineum*, *Actinonaias ligamentina*, *Ptychobranchus fasciolaris*, *Lampsilis ovata*, and *Dysnomia torulosa* remain the 5 most abundant species, though P. *coccineum* is relatively more abundant than in the previously analyzed sample. Because the samples are derived from 28 distinct refuse pits, it is unlikely that the uniformity of the samples is due to the shells being the remains of only 1 or 2 "clambakes." Instead, the uniformity must be due to consistent selection pattern on the part of the aborigines over an extended period of time or a reflection of uniform ecological conditions throughout the collecting period.

In response to a query regarding the paucity of gastropods in the collections, Carskadden furnished 5 additional specimens: 1 specimen of *Campeloma decisum* (Say) from each of features 60, 71, and 86; 2 terrestrial gastropods, *Anguispira kochi* (Pfeiffer) and *Mesodon thyroides* (Say), from feature 55. Naiad remains from these features have not been analyzed, and the gastropods are listed only to underscore their comparative rarity in the collections. Orrin Shane III, in analyzing the vertebrate remains from Philo II, has provided a specimen each of *Haplotrema concavum* Say and *Retinella electrina* (Gould) from feature 41 and 2 specimens of *Mesodon inflectus* (Say) from feature 34.

Of particular interest is a gravid *Campeloma decisum* specimen from feature 60. This

Table 4
Maximum Height (mm) of Interuterine Young of *Campeloma decisum* (Say)

Specimen No.	Maximum Height
1	2.8
2	2.8
3	3.0
4	3.3
5	3.5
6	3.5
7	3.7
8	3.7
9	3.8
Mean = 3.3	

individual contained 9 embryonic shells, the maximum lengths of which are given in Table 4. The presence of such large embryonic shells suggests that this particular *Campeloma* brood was near parturition. Data on interuterine young is sparse, but Chamberlain (1958) indicates that parturition in *C. decisum* is heaviest in late March and early April; he reports, however, that birth may occur from mid March through June. Medcof (1940), on the other hand, has noted parturition occuring from March through September in Ontario *Campeloma,* so that while the gravid *Campeloma* suggest that death occurred during the spring, it may have occurred at any time during spring or summer. Several fish scales (*Perca flavescens*) associated with the naiad material also suggest collecting during both spring and summer.

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